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Image Recognition Classification for Attendance Monitoring System

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Abstract
Keeping track of students' attendance is a crucial part of every educational institution. Multiple criteria, including a student's attendance history, have a role in whether or not they are admitted to a university. Most schools have a reliable attendance system that tracks each student's presence. The use of face recognition technology allows teachers to maintain tabs on student attendance in real time. This article proposes incorporating student attendance data into institutional knowledge management systems. Computer Vision and Matlab face recognition tools are used to monitor student attendance. In this study, we look at the context in which this gadget is needed and at the factors that will determine its accuracy and performance. Organizations on college campuses might use this model to develop attendance recording mechanisms for their members. This study suggests that face-recognition-based recordings might be employed in educational institutions, either as a replacement for or addition to preexisting infrastructure.

Keywords: Attendance tracking, Identifying students, and Facial Recognition all play a role.

I. INTRODUCTION

School attendance has a vital role in a student's overall success. A student's attendance history might have an impact on their likelihood of graduating. The attendance system is designed to accurately record both [1] and [2] presence. Procedures have progressed from being performed by humans to being performed by intermediates or machines as a result of the availability of more and more technical instruments. Researchers and engineers may build novel combinations of activities by combining many sensing devices, such as cameras [3]. Manual, semi-automatic, and technological methods of recording are all employed in higher education [4]. As school is right now, there are a number of options for keeping track of students' attendance, each with its own set of pros and downsides [5]. This attendance monitoring system incorporates state-of-the-art technologies such as RFID [6], social networking sites [7], barcode [8], Wireless [9], fingerprint [10], and Near - field connection Communication (NFC) [11]. The creation of this timekeeping system was a collaborative effort by several educators and programmers. Depending on the variety of sensors at hand,

automated systems may take several forms [11]. The use of face detection and recognition technologies may be applied as a means of keeping track of students' attendance in various classroom settings. Human expressions may be captured and analysed with the use of cameras and other instruments [12]. Each hair and facial goal is predicted using a list of verified faces obtained from the pool of students' faces. In this study, we take a look at how academics are currently making use of face recognition tools. Facial recognition software may provide a solution for universities to build a campus-wide participation system [13].

II. Related works

A subfield of computer science, image processing was developed in the early 1970s [14]. The ability for machines to see an object in the same manner that humans do is essential [15]. That way, it's feasible to identify objects, form opinions, take actions, and tally the quantity of outputs [16]. To put it simply, computer vision [17] is a method through which computers may learn to "see" [18] and interpret [19] the environment in the same way that humans do. This ability allows individuals to use machines for a wide range of jobs that call for close scrutiny and focus, all the way up to the usage of student systems in the classroom alongside instructors. The use of still or moving images for a variety of tasks that benefit both humans and their makers has propelled deep learning to the forefront of technological development in recent years. Methodical, in-depth instruction [19, 20] is one strategy used. As the capabilities of deep learning grow, its application to natural language grows in popularity [21]. In addition to its applications in Machine Learning, Deep Digital Learning has proven particularly effective at handling face identification methods. One such skill is called Convolution Machine Learning (CNN) and it's used for tasks like image recognition [22, 23]. Object detection in photographs is still a work in progress, despite the development of approaches like as the recurrent convolutional neural network and the regions proposal approach. Using the methods described in [25], data inconsistencies may be corrected in datasets.

III. Proposed Methodology

This research was carried out at the "Vietnam" University of Pengurusan in Yogyakarta. Reading widely across several journals provides a solid grounding in both information and expression. Research stages are organized according to the phases of the development process (SDLC), as seen in Fig. 1. The process incorporates communication, planning, modelling, production, and implementation. Participation system criteria are established during the implementation phase. During the planning phase, several related tasks must be planned in order to put the system into operation. Everything that has been planned so far is being transformed into a prototype right now. The project encompasses hardware, software, and underlying infrastructure. Meanwhile, distribution entails actually implementing the solution so that it may be put to good use. Using Machine Learning [24], it is possible to automate processes like face collection and analysis, as well as the searching for and storage of tasks presented to the programme.

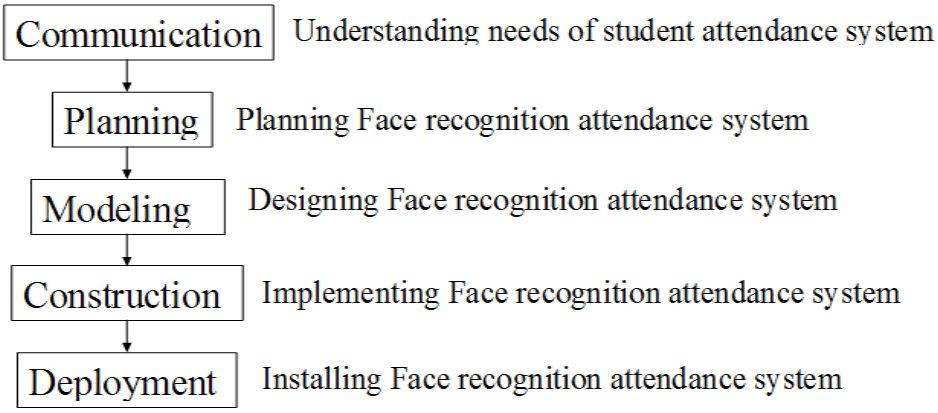


Figure 1. A Waterfall Model for Using Student Face Recognition Software for Attendance Recording.

Therefore, the existing manual process may be automated using the model shown in Fig. 2. Automatically replacing the manual process, and bolstering research and evidence using technology, may lead to more accurate student attendance records. In the processing system, CNN detectors from this work are used for face pattern matching. The CNN package is included in Matlab 2019. Matlab is a numerical computing system that is part of the 4th generation of programming languages. Matlab's object recognition infrastructure is crucial to this method and is used for a variety of tasks, such as image editing, data functional graphing, algorithm creation, and interface design. Inside the machine code, R-CNN acts as a sensor for identifying graphic things. R-CNN, which stands for "regions using CNN models," is an entity identification approach used in machine learning.

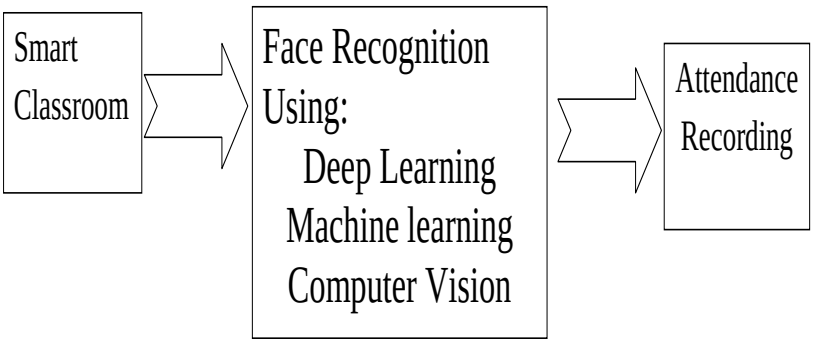
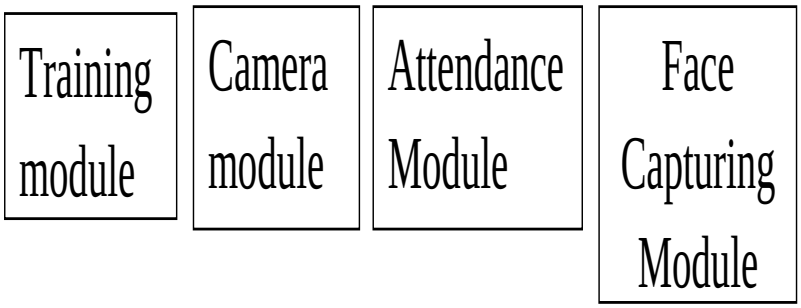


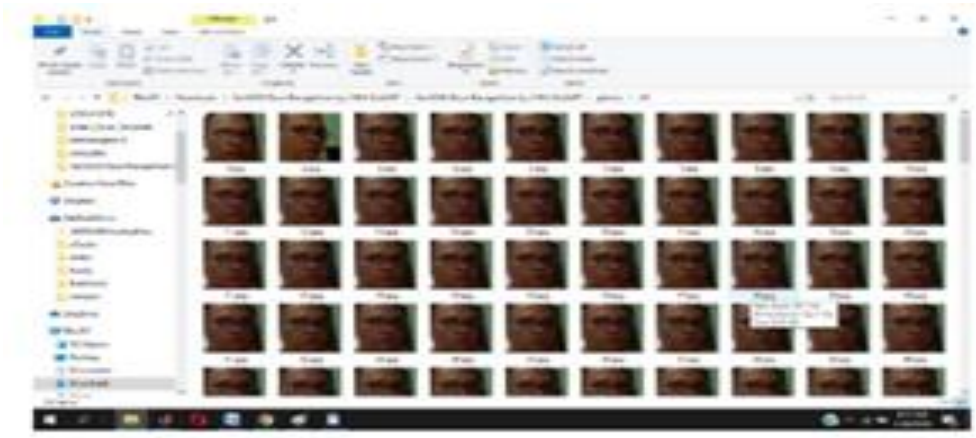
Figure 2: A Convolutional Neural Network-Based Attendance System for Schools

Face capture, an education subsystem, a video camera, and an attendance tracking module are the minimum requirements for implementing facial recognition software for monitoring student attendance. At this juncture, Fig. 3 is shown. Implementing the approach entails collecting data from each student, utilising that data as a training dataset, and then assessing using functions from the CNN package. If the technology's accuracy is more than 90%, as it was in the class prototype, it will be included into the student attendance process.



In Figure 3, we see the several parts of the face-recognition software that is used to monitor pupils.

One of the first steps in keeping track of who was in class and when (as illustrated in Fig. 4) entails photographing instructors' faces to use as a catalogue of sorts for the library's attendance records.



Picture 4: A Bank of Pictures of People's Faces

During the face initialization process, the computer was on the lookout for a picture library like this. The presence of, if any, has been noted in the university's database. Consequently, increasing the number of photographs captured and archived in the collection will lead to better prediction performance in first person identification research. In order to display the collection picture, enough room is needed. It's crucial to think about how much information can be stored. How much storage is needed is proportional to the quantity of photographs kept on hand. As granularity is enhanced, it may become possible to make more precise forecasts. The same holds true for the algorithm's ability to predict pupils' appearances: the greater the number of photographs used as standards in the collection, the better. Second, a "approach" and "completion" module will train the computer to identify children's faces using the data in the database. All of the necessary steps for running the programme are laid out in the code for the learning module. A well functioning software will have been built using effective and productive algorithms. The following is a possible explanation for facial swallowing:

The formula is as follows: image = imread(student face file); [image, face] = cropface(image); % Face has a value of 1 if a human face is present in the image, and 0 otherwise.

For example: image1 = imresize (image, [227 227]); prediction = classify (NewNet, image1); end

The above code begins by temporarily storing the picture in RAM. What's more, if this trove of recollections is ever uncovered, it may be readily identified even by face, especially via the chopping of the human face. It's expected that a human face will turn up. We must next consider the Cameras Module. This feature may potentially recognize persons in photos by comparing them to a trained database. We opted on a place where we thought the kids' faces would be well-captured, and we arranged the camera appropriately. This position allows the system to acquire high-quality photos in a variety of conditions. Another factor that might affect camera performance and final picture quality is ambient light. sto To begin, the focusing and resolution controls of the camera are linked to this image module. As an illustration of the method used therein, see Fig. 5 below. If the identified profile matches the instructed face, the attendance procedure is carried out. In order to better understand human beings, this camera treats individuals like inanimate objects and snaps their photographs to compare to a library of holograms of digitally-created faces. It's a practical use of face recognition technology in a classroom setting. Matlab's compatibility with the hardware allows for this to be accomplished. Here, there was much contemplation about photographing individuals for identifying purposes. In order to improve the accuracy of face recognition, a large number of cameras were set up. Setting up certain perspectives may also improve the accuracy of face prediction programs. Sometimes it's a good idea to keep an eye on metrics like dependability. Check out the accuracy in Fig. 6. Instead of using contemporary technology, the old-fashioned method of using an attendance book was a time-consuming but trustworthy alternative. The information is then used to teach a computer to identify human faces. CNN's testing shows that the training was very effective, with results matching up to within 99 percent of the real statistics when measured against the simulated values from the educators' faces. This was demonstrated through controlled experiments in classrooms comparing the real enrollment of stick shift students to those of students enrolled in classes taught using the new system.

Sample Acquired Image

Sample Images in Traning Set

Fig. 5 Sample images in Training set

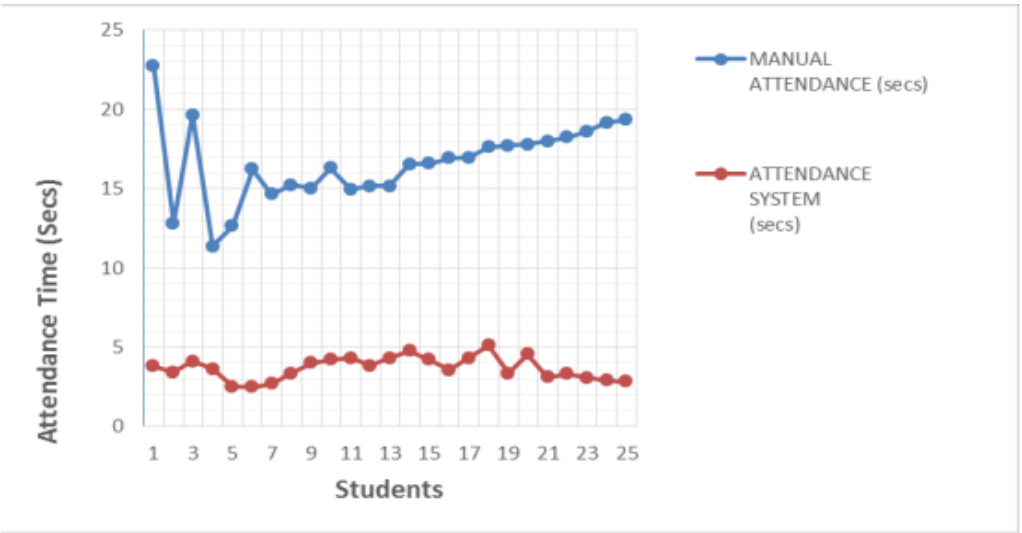


Fig. 6. Accuracy

Several aspects affect how well biometric authentication works in the current system; they include authentication techniques, library coverage, face identification tools, camera clarity, processing power, and the number of detected visually-aided books.

This study found that the accuracy of the detection algorithm inside the current system was affected by at least three factors: the hardware used, the framework and logic, and the situation on the grounds (see Fig. 7).

The central processing unit, storage, pixel components, and network all have a role in the precision and throughput of devices. The foundation and logic are sensitive to a wide range of variables. Reasons for this include the algorithms' efficacy, the platform's layout, and the

accessibility of high-quality examples from the collections. A number of elements, like the intensity of the available illumination, affect how well or accurately something performs in the field.

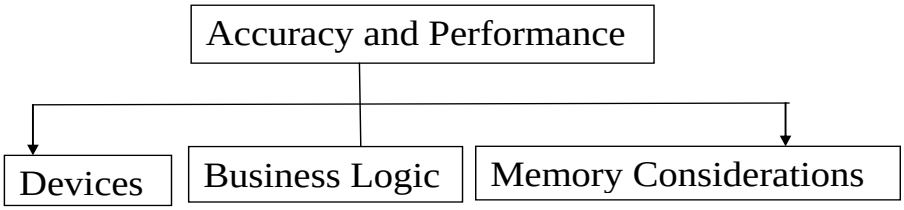


Fig 7: Least three factors

.The success of this paperless digital presenting method was shown by student participation in class presentations using Matlab, R-CNN, and vision and mission statements.

Exam attendance evaluation is one way to develop this method, and it may also be used to combat the manual methods of cheating that have traditionally been used to manipulate attendance records (papers). Attendance records may also be used by teachers to determine a more precise evaluation grade. Not only does this reduce the time spent on teaching thanks to the participation methods, but it is also essential for meetings when there is only a short amount of time for expression. One potential benefit of incorporating a face recognition detector in the design of an attendance tracking system is an increase in accuracy and a reduction in the amount of fraud that may arise when relying on human oversight of absence. As a basis for the management of educational activities, this user may detect and oversee lecturer involvement and student tests in a transparent and realistic manner. According to the findings of this study, implementing attendance utilizing Object Tracking software might make it easier for students to have access to such video content.

IV. Conclusion and Future Scope

In the future, it is possible that instructors may be able to monitor student engagement in class activities by using computer vision's picture recognition characteristics. Four computer vision modules were built using this method to track student attendance based on facial recognition. Approval of the system relies on four components: the control panel, the training module, the primary camera, and the punctuality subsystem. Several factors, including the environment, the hardware, and the software, might impact the system's accuracy and performance. The results of this research provide credence to the idea that computer vision recording might be employed in schools, either as the primary system or as an auxiliary network for an already existing one.

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